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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 193

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Ban on Negotiations Abroad

Melbourne THE AGE in English 19 Apr 83 pp 1, 3

[Article by Stephen Mills]

[Text] DARWIN. — The Federal Government has revoked the negotiating licences of uranium companies, preventing them from seeking overseas buyers for Australian yellowcake.

The freeze on negotiating overseas contracts has been imposed while the Government sets new guidelines on uranium prices and production.

The withdrawal of licences — the Labor Government's first step in implementing its controversial anti-uranium policy — has led Pancontinental Mining Ltd to decide not to go ahead with its Jabiluka project this year.

Pancontinental told a meeting of Aboriginal traditional owners of the Jabiluka deposit in Arnhem Land yesterday that it had tried to win Federal Government approval for one overseas contract, with a British power company.

But at a meeting with Federal Ministers in Canberra recently, Pancontinental's chairman, Mr Tony Gray, was told its attempts to sell yellowcake to France would be stymied by the continued French nuclear testing in the Pacific.

The Labor Government telexed all companies with negotiating licences soon after it won office in the 5 March election to tell them of the revocation.

Companies were told they could re-apply for licences. But it is believed no licence will be granted until the Government's new guidelines are decided.

The guidelines will cover key contract conditions such as minimum price, the length of the contract and the likely lead time before production gets under way.

The freeze was decided on well before the Aboriginal Affairs Minister, Mr Holding, moved to set a three-month target date for the Government's announcement of its uranium policies.

Mr Holding asked them at a meeting of the Aboriginal owners at Koongarra, also in Arnhem Land, on Sunday, not to sign an agreement with the Canadian-based Denison Australia Pty Ltd until the Government's policy was in place.

At its Federal conference last July, the ALP decided to phase out rather than repudiate existing uranium production in Australia. But any contracts signed after July 1982 would be repudiated.

The Ministers of Trade, Mr Bowen, Environment, Mr Cohen, Minerals and Energy, Senator Walsh, and Mr Holding, are now working on ways of applying the conference platform to specific uranium deposits.

Criticism from Britain

Sydney THE SYDNEY MORNING HERALD in English 26 Apr 83 p 15

[Article by Peter Freeman and David Wheeler]

[Text] The Federal Government's decision to revoke the negotiating licences of uranium companies has come under attack from Britain's biggest uranium user, the Central Electricity Generating Board.

A spokesman for the CEGB said the board had a "commercial understanding" with Pancontinental Mining for the supply of uranium from its proposed Jabiluka mine in the Northern Territory.

However, without the right to contract for more uranium sales, Jabiluka might not go ahead and the CEGB would not get its uranium, he said.

The Minister for Energy and Resources, Senator Peter Walsh, dismissed this criticism yesterday and said the problems facing Jabiluka didn't stem from the decisions of the new Labor Government.

"Pancontinental sought approval last year for a contract to supply around 150 tonnes of uranium to CEGB and Pancontinental which for Trade, Mr Anthony, refused to grant it," Senator Walsh said.

"This was done because the contract price wasn't good enough," he said. "Any deal between the CEGB andd Pancontinental which has fallen through is not due to the action of the present government."

In another development, the recent moves by the South Australian Government to block uranium mining have been attacked by the SA Chamber of Mines in the latest issue of its journal.

The SA Government would be throwing away up to 4650 jobs for the State by turning its back on the uranium industry, the chamber claimed. And that excluded likely jobs from the proposed Roxby Downs uranium-copper-gold mine, it said.

According to the chamber, development of SA's Honeymoon and Beverley uranium deposits, a uranium deposits, a uranium conversion plant and an enrichment plant, would generate between 3,750 and 4,650 news jobs through pilot, construction and full production stages and in related service industries.

The Roxby Downs project, a joint venture between Western Mining and BP, would provide between 19,000 and 33,000 more jobs, the chamber said.

Against these projections must be set the views of many industry analysts who say that, far from new uranium contracts being in the pipeline, the current economic downturn could put pressure on existing producers to renegotiate contacts.

According to Senator Walsh it will be at least six years before demand increases sufficiently to justify new contracts. As a result the question of Labor's approach to new uranium mines being opened was largely hypothetical, he said yesterday.

The Labor Party's platform does not appear to leave room for any new uranium mines, except for those where uranium is mined incidentally to other minerals, such as Roxby Downs.

The present Government has so far shied away from publicly clarifying its position, but a committee of four ministers is currently working on Labor's uranium platform to turn it into Federal Government policy.

One member, Mr Clyde Holding, Minister of Aboriginal Affairs, said recently the Federal Government would make a decision by the end of June on whether any new uranium mines would go ahead.

It is understood uranium companies were told they could reapply for negotiating licences at the time these were withdrawn, but none has yet done so.

This presumably reflects the general belief that no licences will be granted until the Government's approach to uranium is finalised.

In contrast to the present uncertainty, the spokesman for the CEGB said the board's planning had assumed Pancontinental's Jabiluka mine was already well down the track.

He said the board was still waiting to hear from Pancontinental about the details of the Government's decision to withdraw negotiation authorities for arranging new contracts.

"If the Government has withdrawn letters of determination (negotiating authority), then the Pancon mine might not go ahead and we won't get our contract," he said.

"It's a very small proportion of Jabiluka, which is a superb deposit. It would be a shame if it was not mined."

The CEGB spokesman said the understanding with Pancontinental had provided for a base tonnage with options which were subject to other potential developments.

One of those developments could be the Sizewell B reactor, which is at present under scrunity in a public inquiry and might not go ahead.

Pancontinental had proposed to begin work on the Jabiluka mine in May but shelved this last week. Mr John Landrigan, an esecutive director, said at the time that it would be unlikely that the project would start this year.

Neither he nor the company's managing director, Mr Tony Grey, was available for comment yesterday.

Ben Lomond Export Ban

Brisbane THE COURIER-MAIL in English 23 Apr 83 p 10

[Text]

CANBERRA.— Export licences would not be granted for uranium to be shipped from Ben Lomond in north Queensland, the Energy Minister, Senator Walsh, said yesterday.

He said this after the Australian Democrats suggested Australia halt all uranium mining ventures in which French companies had an interest after continued French nuclear testing in the South Pacific.

Senator Macklin (Aust. Dem., Qld) called on the Federal Government to halt all projects such as Ben Lomond.

He said the Ben Lomond project was 100 percent owned by the French company Minatome, with the French Government having a 35 percent interest.

"The Australian Government has previously sent a high-level diplomatic protest to the French to cease nuclear testing. It failed. We must take stronger action," he said.

"Ceasing any contracts of Australian uranium to France, or French interests in Australian uranium mines would be appropriate.

"We cannot sit by and watch France harm the environment of the South Pacific without further protests that mean action."

Replying to Senator Macklin in the Senate, Senator Walsh said Labor policy said explicitly uranium would not be supplied to France as long as France continued to test atomic weapons.

Senator Walsh said he fully endorsed the sentiment of the Labor policy.

He said be regarded the French action in the South Pacific as being unacceptable.

"It would be feasible to conduct such tests in the Mediterranean or the Bay of Biscay," he said.

The Foreign Minister, Mr Hayden, had issued a formal protest.

An environmental impact statement had gone or would soon go to the Home Affairs and Environment Department.

In **London**, a Central Electricity Generating Board spokesman said the Australian Government's decision to revoke negotiating licences had threatened British uranium supplies from the Jabiluka project in the Northern Territory.

Aboriginal Threat to Roxby

Canberra THE WEEKEND AUSTRALIAN in English 23-24 Apr 83 p 4

[Text] CONSTRUCTION of the $20-million uranium and copper pilot plant at Roxby Downs, in South Australia's far north, could be delayed indefinitely by a dispute over Aboriginal sacred sites.

An impasse is believed to have developed between the Roxby Downs joint venturers, Western Mining Corporation and BP Australia, and the Kokatha people, over the content of the environmental impact statement now being prepared under the terms of the Roxby Downs Indenture Act.

On Wednesday, the State Minister for Environment and Planning, Mr Hopgood, attended a meeting between the joint venturers and about 50 members of the Kokatha tribe.

He has told Parliament he is confident problems incurred in collating anthropological material will be ironed out in time for the impact statement to be ready on schedule (under the terms of the Indenture Act, the statement must be ready by the beginning of June).

But his remarks contradicted those of a spokesman for the Kokatha, Mr Henry Croft, who attended Wednesday's meeting.

Mr Croft said the Kokatha were not satisfied that Aboriginal interests in the Olympic Dam area were being considered adequately.

'Impossible'

In relation to essential requirements, such as assessment of the impact of the proposed project on tribal women, the commitment to recording religious sites and the details of protecting the sites, more work would have to be done by the Kokatha and an anthropologist of their choice.

Also, the draft of the environmental impact statement and its additional supplement had failed to address the series of guidelines set by the Government.

Mr Croft added that the only way in which the guidelines could be fulfilled was if the Kokatha people employed people they trusted.

The Kokatha had lost confidence in Roxby Management Services, who, he said, already owed them a substantial sum for the trial survey that had been completed.

In addition, the Kokatha felt aggrieved that eight sites had already been damaged, and legal advice was being sought about these sites.

"In those circumstances, the Kokatha find it impossible to have faith in the procedures outlined in the supplement to the environmental impact statement," he said. Inadequate protection had been offered to the Kokatha, leading to irreparable damage to Aboriginal people and their culture.

CSO: 5100/7530

BRIEFS

HELP FOR NUCLEAR-FREE MOVEMENT--Sydney City Council is to spend $5,000 establishing a secretariat for councils which have declared themselves nuclear free zones. Earlier this month the City council hosted more than 30 representatives from unclear free zone councils around Australia, including Brisbane and Melbourne City. Alderman Robert Tickner, who was elected chairman of the secretariat, said it was appropriate for Sydney City Council to indicate its leadership in the anti-nuclear movement by making the contribution. All nuclear free zone councils will be asked to pay $100 as an affiliation free with the secretariat. [as published] They will also be asked for other contributions towards the running of the secretariat. At the meeting 13 policy decisions were adopted which included expressing concern at the storage of radioactive waste from industry, hospitals and the research industry. The meeting voted to ask the Prime Minister, Mr Hawke, to look at establishing a central storage area for radioactive materials. The secretary will write to all 700 councils in Australia asking them to become part of the anti-nuclear movement, and to distribute leaflets explaining the dangers of nuclear warfare and nuclear materials. The mayor of Hiroshima and Nagasaki sent messages of support to the meeting. The secretariat will employ a research officer for a short time to compile information about the potential role for local government in nuclear issues. It will support other anti-nuclear organisations and suggest to individual councils how they could support the activities of these groups. [Text] [Sydney THE SYDNEY MORNING HERALD in English 23 Apr 83 p 15]

CSO: 5100/7530

CNEA'S RESEARCH, DEVELOPMENT CHIEF ON TECHNOLOGY TRANSFER

Buenos Aires LA NACION in Spanish 15 May 83 supp pp 6-9

[Article by Julio Orlone: "Argentine Technology for Latin America"]

[Text] With the uranium reprocessing plant, the National Atomic Energy Commission moves into the lead in nuclear development. Carlos Erramuspe: "Developed of a policy of self-sufficiency." For more than 30 years, the National Atomic Energy Commission has been an example of the creative capacity of Argentine investigators. Its efforts, aimed at achieving self-sufficiency in nuclear fuels in order to safeguard the country against foreign manipulations, have given rise to an exporting capacity in terms of supplies for industry and a product which is the most highly esteemed in the workd today: Technology.

Argentina is a traditional supplier of raw materials on the world market; it could become a nuclear technology exporting country. As a matter of fact, it already is, as witnessed by the fundamental participation of the National Atomic Energy Commission in the establishment of Peru's first atomic center; but emerging prospects are very broad and point to something which is no less certain: The very high creative capacity of Argentine researchers in the basic sciences and in technology.

Dr Carlos Erramuspe, CNEA [National Atomic Energy Commission] research and development director, told the magazine LA NACION that, during the recent International Conference on Nuclear Technology Transfer, held in Buenos Aires, United States experts mentioned one of the program's topics as a case of cooperation and not of transfer, from a developed country to a developing country. What did that involve?

Around 1978, when the government of the United States implemented the Nonproliferation Act [Treaty], the enriched uranium, which was used to supply the experimental reactors (in which radioisotopes were being produced for medicine), had to be reduced from 90 percent enrichment, as was customary, to 25 percent uranium 235, the element which triggers the nuclear fission reaction.

"That restriction on enriched uranium," says Erramuspe, "placed many countries, including Argentina, in a difficult situation: The experimental reactors had to

be supplied with 90-percent enriched uranium because they were designed for that; otherwise it would be necessary to make complicated and expensive modifications in the reactor. But there was another way out: Modify the fuel elements and, into the same unit of volume, insert the uranium 235 necessary to get 90 percent."

As is customary in the CNEA, the problem was tackled with utmost energy. "What we were trying to do was to get fuel elements which would contain a larger quantity of uranium per unit of volume without changing the geometry of those same fuel elements. This was a search of international concern," Erramuspe stressed, "because, if that solution did not work, all of the world's radioisotope-producing reactors would have to be rebuilt."

The race was on and CNEA investigators had the target of putting 3.5 grams of uranium per cubic centimeter. In competition with foreign groups--French, German, United States--technicians in the Materials Department of the CNEA tackled three possible lines of work, they developed them and they subjected the final product to tests in United States laboratories at Oak Ridge. There they irradiated the fuel elements to check their strength and yield. What was the result?

Major Success

"We have the satisfaction of being able to say that our technological groups in the Nuclear Fuels Department were successful in these three lines," says Erramuspe. "But they not only achieved good results but, in those three lines they managed to achieve uranium densities in the fuel which were higher than those achieved in the international first-line laboratories of the United States, France, and West Germany. In these three lines, Argentine developments achieved the highest yield and first place. This led to the launching of the current low-enriched experimental fuel production program."

We are not very much accustomed to seeing Argentina achieve major technological advances; however, it is not by chance that this happened within CNEA. "The Commission was established more than 30 years ago as an agency devoted primarily to scientific and technological research," Erramuspe pointed out, "and the continuity maintained during those three decades is what sustains the entire broad and diversified effort today. Research of a basic and applied nature and in-house developments are being promoted to achieve a mastery of nuclear technology particularly in the area of the research and development directorate. In this connection, activities dealing with the fuel cycle, from prospecting all the way to the final treatment of fuels used, are essential."

According to recent studies by the Energy and Power Institute of the United States, the only secure technology at this time in meeting the world's energy requirements is nuclear technology. Argentina realized that basic factor during the decade of the 1960's and that explains the importance assigned by CNEA to self-sufficiency in nuclear fuels. "The Commission saw that it was necessary to have a policy of self-sufficiency in order to be beyond the reach of any possible foreign manipulation. The country had to be in a position to resist international pressure and it had to have a capacity to decide by itself what was in the national interest. We must keep in mind," Erramuspe emphasized,

"that nuclear fuel is the key in supplying the power plants. This is a daily, constant supply function, as in the case of petroleum for the thermal power plants and, if there is no fuel, the power plant grinds to a halt. Well, now, in Argentina we will not depend on any nuclear fuel supplier other than our own."

Beyond the Borders

That enormous effort by CNEA researchers, aimed at national nuclear self-sufficiency, is also the origin of an exporting capacity in terms of supplies for the nuclear industry and, what is even more important, in technology, the most highly esteemed product in the world today.

"Our knowledge of all facets of the fuel cycle enables us to think of the Latin American countries and perhaps also other regions as potential customers for our developments in terms of finished products and technology," Erramuspe pointed out. "The first major action beyond our borders was the supply of a training reactor to Peru, the RP0 (zero power reactor) and a research reactor, the RP 10. That opened up prospects for exporting this research and radioisotope-production reactor technology to other Latin American countries. Argentina could sell complete reactors, including the low-enrichment fuel elements which we are going to make in the plant being built at the Constituyentes Atomic Center."

Work done for more than 2 decades by the Materials Department (previously called Metallurgy Department) of the Commission constitutes the basis for the development of the various phases of the fuel cycle. The zircalloy pipes, consisting of an alloy whose main component is zirconium, constitute a very important aspect: The quality of the pipe and the welding seams connecting the pipes, to form what could be called the uranium container, must be very high since the pressures in the reactor's core are very strong. Technology for pipe manufacture involved very laborious preparation. "This involved some very special techniques in metallurgy since these are new metals," says Engineer Jorge Kittl, chief of the Special Alloys Plant Project. "We have been working on all of this since 1955, when we began to train researchers and to accumulate knowledge. Then, starting in 1968, we began the preliminary feasibility work in the course of which we studied other possible metals and in 1975 we fully embarked upon the effort which, i 1984, will culminate with the full-scale operation of the Pipes and Semifinished Products Plant."

Right now, the plant is already producing a minimum share of the 400,000 meters of zircalloy pipes per year which it will be able to turn out (the demand from Atucha I and II and from Embalse is 300,000 meters per year); but "we are also beginning to go into a special production program involving 1,000 meters to be shipped to Brazil for evaluation; they are earmarked for the future supply of the Angra Power Plant," Erramuspe explained. "This is another very important way of exporting and cooperation. Over the next several years we hope greatly to increase our cooperation with Brazil in technology and basic research, for example, when we will open the Tandar heavy-ion accelerator; this is an instrument for nuclear physics which is unique in Latin America; it is one of the few in the world."

Research--Key Issue

New scientific publications are constantly being put out all over the world. However, this proliferation of printed matter does not signify a scientific information explosion. "We must not deceive ourselves on this delicate topic," explained Dr Jose Galvele, chief, Materials Department, CNEA. "Right now, scientific knowledge represents a great investment in terms of capital and human resources and we may well imagine that, in the not very distant future, the volume of international publications on topics dealing with materials suitable for technological development will decrease. We can see very clearly--at least those of us who are devoting special attention to this--that there are no restrictions in those disciplines whose technological application is remote. Nor are there any restrictions regarding the meaning of the better use of equipment for commercial promotion by technology producing enterprises. But I emphasize that there are very few publications in fields which can be developed technologically."

According to Galvele, who took the example of metal corrosion, "there is much being published on alloys that are no good or on equipment breakdowns but very little comes out on new alloys or new corrosion inhibitors. Those are the ones which we concentrate on when commercial reports come out and when the items are already protected by patents and trademarks."

Obviously, the panorama described by Galvele stresses the primacy of research on nuclear materials.

However, the attention of foreign experts visiting the CNEA is drawn to the broad range of topics being investigated in the Materials Department, an effort that is much more varied than in other atomic commissions. 'This can be explained," says Galvele, "by the nation's lag in metallurgy. When studies of nuclear concern were begun in the United States, Great Britain, France, or Germany, those countries had a long-standing metallurgical tradition. Consequently, the atomic studies had to be devoted to the determination of those aspects of metallurgy that were of specific nuclear interest. On the other hand, the situation was different in Argentina: We had no tradition in metallurgy, nor in steel, nor in corrosion, welding, plasticity, diffusion, or solidification. It was not enough to set up a specifically nuclear metallurgy laboratory. We had to set up a materials research center which would cover all areas."

Nuclear Fuels

The summary of this history of a little more than 30 years in nuclear research and development could be represented by the Fuel Elements Plant where the various decisions made by the CNEA flow together to lend form to its operating style and its coherent policy. The project began in 1964 with the objective of developing a technological capacity to be able to make fuel elements for power reactors, in other words, for those that keep the nuclear electric power plants running.

"Around 1970," recalls Engineer Helmut Koll, chief of the FECN [Nuclear Fuel Elements Enterprise] project, "when we were already working on the construction of Atucha I, we decided to build an industrial plant to make fuel elements. The knowledge we had accumulated enabled us to figure out what we would have to buy to equip it so that we would be able to set up a factory by procuring individual equipment items abroad. This way of tackling the establishment of the factory, instead of the faster solution involving turnkey purchase, enabled us to put all of the knowledge we had acquired to use and to go to subsequent development stages with greater autonomy. Besides, under that system we did not pay any royalties for anything."

When the factory was laid out, it was designed to supply three power plants, with a first stage to supply Atucha I and then the magnificent power plant at Embaise with fuel elements of another type, completely made in the country, with a complete development line of our own. For Embalse we will have to import fuel only for a period of 2 years, after that the CONUAR [Argentine Nuclear Fuel Corporation, Inc.] will produce 100 percent," said Koll.

The establishment of the CONUAR enterprise, made up to the extent of 25 percent by CNEA, 50 percent by a private enterprise (Perez Companc), and another 25 percent from another enterprise to be incorporated, demonstrates the practical application of another concept developed by CNEA: The nation's private industry must take charge of development efforts which do not present reasons for maintaining a government monopoly. This criterion of relieving the national government of tasks which private industry can properly tackle has been helpful in providing an incentive for certain Argentine enterprises to pay more attention to development efforts deriving from nuclear research and carried out domestically. Koll pointed out that this policy could serve as a model for other sectors of the nation's industry at this time when we seek to revive it.

Low-Enrichment Project

At the Constituyentes Atomic Center we have the new low-enrichment nuclear fuels manufacturing plant (ECBE project) where we will soon be able to see the first specific results of experiments reported by Erramuspe. Engineers Jorge Gomez, project chief, and Carlos Kohut, production chief, say that the plant is being built with a view to the production of one fuel element per day, using maximum safety processes, with a high percentage of Argentine equipment.

"As in many other cases, we could have purchased the equipment abroad, for example, in Germany, but we preferred to wait a little longer and to do the job ourselves," Gomez emphasized. And then he continued: "This type of decision characterizes the work done by the CNEA. Just imagine, right now, we are working with enriched uranium coming from the production remnants of previously used fuel plates [as published]. That uranium is recovered in a laboratory specially devoted to that task and set up at Ezeiza. Every step implies a research and development effort and a great result in technological training and knowledge. The 20 persons who are going to work in this plant are highly trained for their jobs. If to this we add the basic concept of guaranteeing the quality of the processes involved, then we can easily see why we can speak of exporting. We know that we are in an excellent position to compete with other manufacturers."

Pilot Plant for Uranium Reprocessing

"Since the existence of this project was made public, you have been the first newsmen to visit the nuclear fuel reprocessing plant," the magazine LA NACION was told by Col Luis R. Arguello, the chemist in charge of the LPR (Radio Chemical Processes Laboratory), established at the Ezeiza Atomic Center of the CNEA. "This is a laboratory which sprang from work conducted between 1967 and 1970; it has now been converted into a pilot plant which became necessary when the nuclear powers refused to supply information on reprocessing. This is why this technological development effort had to be conducted by Argentines in an absolutely original form."

The topic of reprocessing is complex and delicate in terms of the quality of the chemical process which is not conventional but rather of the nuclear type; that topic is mentioned as a "sensitive" element in the jargon of security experts. This is a consequence of military uses and the strategic importance deriving from any country's possession of plutonium. Consequently, reprocessing technology has always been withheld from international knowledge. "This is an advanced technology which is not transferred at any price," says Armado Nunez, the man in charge of radiological security and personnel training matters at the LPR.

Withstanding Air Crash

Set up in the middle of the forest of Ezeiza, the LPR plant is being built with a series of impressive security requirements: "The building complex (the power plant, the cells for chemical processes, and the two auxiliary units on either side) are built with earthquake-proof techniques and are prepared to receive an impact equivalent to that of an aircraft crash," says Arguello. Although there is no record of any prior earthquakes in the vicinity of Buenos Aires, proximity to the international airport means that the second precaution must not be disregarded. Nor should the first one, in reality, since the most important thing is to reduce all risks deriving from the handling of radioactive material, such as plutonium, which is dangerous also by virtue of its toxicity, to an absolute minimum."

Concrete walls, 1 meter thick, with just a few wire glass windows of the same thickness, have been checked out by means of ultrasound, applied every 20 centimeters, to detect any defect, no matter how small it might be. These walls surround certain parts in the interior of the LPR, for example, the place where the fuel elements, coming from the nuclear power plants, are cut.

The plant's ventilation system deserves a paragraph by itself. Immense pipes, made by a private domestic enterprise, move the air and the steam used in propelling the fluids inside the processing cells because, for safety reasons, we use neither pumps, nor electromechanical processes in treating the irradiated material. But the ventilation and air filtration pipes inside the plant also constitute a complex system, leading to the outside through so-called absolute filters which guarantee total decontamination. The pipes, whose cost comes to several million dollars, move 300,000 cubic meters of fluid per hour.

Here are some more statistics: "We used 32,000 tons of concrete and 1,000 tons of steel in the construction phase. We also put in 35 kilometers of pipes and we made 25,000 welding seams, programmed by computer and checked individually," Nunez announced.

Guaranteed Quality

During our visit to the plant, we were guided not only by Arguello and Nunez, but also by engineers Daniel Zampini and Miguel Cazal, young members of a special team trained by the CNEA as part of the training program. From the tangled mockups of processing cells (the system's complexity makes it impossible to work only with blueprints), all the way to the deep cells which are sheathed with inoxydable steel, built below ground level, where the plutonium will be stored, we were able to get an idea of the work done "under the strictest quality assurance (QA) standards, a concept which sprang up in the armament industry of the United States and which can be applied to any industrial activity," as Zampini and Cazal explained.

"It consists in checking on all components of the unconventional chemical plant, from the design phase, going on to the raw material, the most detailed on its manufacture, the number of workers participating in the effort, quality controls (special x-rays for welding the pipes, for example), and assembly. When we have to know the cause of any failure, all we have to do is go back to the records. But with this kind of quality assurance system, the failures are much less because each step is checked much more closely."

The basic engineering work for the project was done by CNEA and was finished in 1977. The construction, assembly, and supply of components were farmed out to private Argentine enterprises. Right now, the civil engineering work, that is to say, the construction of the building that will contain the plant, has been almost finished; electromechanical assembly is completed to the extent of 50 percent and engineering work was started for the installations that will operate along with the LPR and that are intended for the treatment of the plant's radioactive waste. According to Arguello, "The development work done by CNEA and the private enterprises cooperating in the effort have placed the country in a state of technological advance without precedent in the nuclear area as a response to the initial challenge."

Reason Behind Challenge

In the Argentine nuclear plan, which includes the construction of four power plants in addition to Atucha I and Embalse, the use of natural uranium as a fuel signified a development alternative for coming up with a self-sufficient fuel cycle; this cycle is closed in the first stage with the fuel elements and special alloys plants and (in a second phase) we have the reprocessing and production of mixed oxides of uranium and plutonium, as future objectives.

The procurement of plutonium, which particularly irritated the United States because of its possible utilization in nuclear devices for military uses, is an objective which CNEA has set for itself as a logical consequence of the existence of irradiated fuels in the reactors of nuclear electric power plants.

The fuel elements extracted from the reactors are deposited first of all in the so-called decay piles but the useful life of such piles is much shorter than the persistence of radioactivity in the irradiated fuel elements; this is why it is necessary to process them chemically and to extract the unused uranium and the plutonium from them as well as to prepare the useless components for evacuation as radioactive waste.

Arguello noted that "in spite of various pressures, Argentina has decided to reprocess the nuclear fuel irradiated in its power plants as a way of coping with the future energy shortage. This closes the nuclear fuel cycle in a complete manner. The re-use of small quantities of plutonium, for example, in making mixed fuels (uranium and plutonium) for heavy-water reactors, such as ours, will lead to a virtual doubling of the country's nuclear energy reserves."

5058
CSO: 5100/2068

BATISTA ADMINISTRATION NUCLEAR PROGRAM FAILURES VIEWED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 24 May 83 p 34

[Text] Rio—With the departure of Paulo Nogueira Batista from the Brazilian Nuclear Corporation (NUCLEBRAS) and his appointment as head of Brazil's permanent delegation to Geneva, a phase of the Brazilian nuclear program seems to be closed. It was marked by the misapplication of funds, constant failures and the adoption of certain procedures that finally resulted in the episode of his dismissal when President Joao Figueiredo became irritated with the manner in which the bidding for work on the Iguape-1 and Iguape-2 plants was conducted.

For 9 years, Nogueira Batista was the director of the nuclear program, wielding power as few times seen among second-level technocrats. He went over the heads of ministers in the energy area, met with the military of the Security Council and negotiated directly with German bankers for the huge financing for the sector. The failures in executing the projects and in obtaining sensitive enrichment technology were covered up by the facility with which he obtained loans abroad. His power was expanding. Until Paulo Nogueira Batista thought he could dispense with holding competitive bids for the work on Iguape-1 and Iguape-2, simply naming the Mendes Junior and Camargo Correa companies: the second and third place bidders, respectively, in another competitive bid for construction of Angra-3, the winner of which was the Andrade Gutierrez company.

In that way, the former president of NUCLEBRAS had decided to compensate the two losers of the first bid, asking them to form a partnership to build the Iguape nuclear plants, exempting those projects from bids. The reaction in Planalto Palace was extremely negative and the efforts made by Paulo Nogueira Batista to hold on to his position were of no avail. His fate was sealed, although the reason alleged for his dismissal was the lack of funds to continue the nuclear program.

Uncertain Legacy

And the legacy of Paulo Nogueira Batista is still an unknown factor. That is the least that can be said about a program that thus far has required more than $3.5 billion and has not produced anything in terms of generation or of enriched uranium, its total expenditures being estimated by NUCLEBRAS

itself at more than $18 billion. Obtainment of the transfer of sensitive technology itself, a basic objective of the German-Brazilian agreement, seems to be in jeopardy, if not very distant, as two former directors of NUCLEBRAS demonstrated when they resigned because they did not agree with the course this program was taking, namely, General Dirceu Lacerda Coutinho, director of the NUCLEBRAS Istopitic Enrichment Corporation (NUCLEI) and Joaquim de Carvalho, director of the NUCLEBRAS Engineering Corporation (NUCLEN).

With regard to the enrichment of uranium, Paulo Nogueira Batista said during a lecture at the War College (ESG) that the delays opened up opportunities for review of the original scheme for the construction of a plant for 200 tons of separative work-units per year. Originally scheduled to operate this year, the results obtained in perfecting the German centrifugal jet process technology would, in his opinion, permit stretching the timetable for installation of the plant, fitting in better with that process.

In the opinion of Paulo Nogueira Batista, Brazil will be in a position to enrich uranium industrially beginning in 1986 at a level of 60 tons, a capacity that will rise to about 300 tons beginning in 1988. But it is difficult to believe in the success of an industrial process that undergoes constant delays, was reformulated from 200 tons to 60 tons and implied the change of the whole design to be adapted to a new gas mixture, no longer hydrogen but helium, after 8 years of research and work in the laboratory.

And there is the possibility of failure on the fundamental matter of the nuclear agreement, namely, obtaining the enrichment process, otherwise, the country would exchange the current dependence on oil for another worse one, dependence on uranium, which was exhaustively spelled out to Paulo Nogueira Batista by the director of the company that is responsible for the enrichment process, General Dirceu Lacerda Coutinho, one of the three engineers in the nuclear area with the best background and work carried out in Brazil.

Like Commander Antonio Carlos Didier Viana and Hervasio de Carvalho, General Dirceu Lacerda Coutinho spent several years in the United States taking courses on nuclear engineering, specializing in enrichment processes, as part of the nuclear training program established immediately after the war by Admiral Alvaro Alberto.

Feeling that Paulo Nogueira Batista was not listening to him, General Dirceu Coutinho prepared a detailed report that he forwarded to the National Security Council, the National Intelligence Service (SNI) and President Geisel. Since he did not receive any reply, he went to the nuclear congressional investigating committee (CPI), testifying in secret to show various confidential documents that proved his assertion that "Brazil had been by the Germans." General Dirceu Coutinho showed that in the preliminary negotiations for the nuclear agreement, the Germans proposed to build a uranium enrichment plant using the ultracentrifugation process, before the signing of the agreement.

Months later, when various government actions and diplomatic initiatives had made the agreement almost irreversible, the Germans alleged that the transfer of the ultracentrifugation process would not be possible because its patent was not the property of Germany alone but also of Britain and the Netherlands, since it had been sold to Urenco, in international enterprise. In its place, Brazil could accept an untested technological process by a Professor Erwin Becker, which had already been rejected by South Africa.

Square Zero

In other words, Brazil would have to start from square zero and trust that Professor Becker's process would be successful. And 9 years having elapsed, it does not appear that it is. At least in economic terms, it does not give evidence of the minimum viability, demonstrating in the laboratory a process that would require 15 times more energy than gaseous diffusion and 45 times that of ultracentrifugation, two other enrichment processes more in use. Thus, as a result of the negotiations headed by Paulo Nogueira Batista for the nuclear program, Brazil runs the risk of having nine nuclear plants installed and not having any way of obtaining the enriched uranium by its own means, remaining dependent on the difficult international market for that fuel.

Just as he did not pay attention to the warnings of General Dirceu Lacerda Coutinho, Paulo Nogueira Batista also did not listen to his industrial director in NUCLEN, engineer Joaquim Francisco de Carvalho, generating a new crisis and the resignation of the latter. NUCLEN was the agency responsible for absorbing the technology and Joaquim de Carvalho proved that this process was not taking place and could never be implemented unless research agencies such as the Institute of Technological Research (IPT), the Technological Development Council (CODETEC) of the University of Campinas (UNICAMP), the Department of Materials Engineering of the University of Sao Carlos, the Aerospace Technological Center of Sao Jose dos Campos, the Technological Center of the University of Santa Catarina, among others, were called to participate in that process.

With a certain domineeringness, Paulo Nogueira Batista did not permit the presentation of views by his aides that were contrary to the basic determinations of the program. At the time of his departure, Joaquim de Carvalho sent a document to congress stating that "in the polarized atmosphere that today surrounds the nuclear agreement, it becomes extremely difficult if not impossible for its promoters calmly and impartially to consider even the views--many times valid, some of them serious and concerned--formulated by internationally renowned Brazilian scientists and professors, officials and experts in the energy sector, and even industrialists of proven experience."

Practically the whole original team of NUCLEBRAS was changed in the midst of successive internal crises, hushed up in order not to appear in the press. Carlos Sillus Martins Pinto, considered Paulo Nogueira's right-hand man because he was president of the Brazilian Nuclear Technology Company, the agency that later originated the powerful NUCLEBRAS, was moved from the industrial directorship to a subordinate position. Hercules Dutra, financial

director, left because he did not agree with the balancesheets that Paulo Batista wanted to present. Geraldo Moreira, the director of administration, also requested his resignation, alleging intellecuual and functional differences with the president. Of this team, pursuing the same dream of fantasy, there remained at the end only John Milne Albuquerque, who has held almost all of the directorships, and Paulo Nogueira Batista himself, advised to resign upon learning that the president of the republic was not going to return him to the position that he exercised so domineeringly and with such little efficiency.

8711
CSO: 5100/2070

ANGRA-I TO OPERATE AT FULL CAPACITY IN NOVEMBER 1983

Rio de Janeiro JORNAL DO BRASIL in Portuguese 27 May 83 p 20

[Text] The president of Furnas, Eduardo Seabra, guaranteed yesterday that the Angra dos Reis-I nuclear plant will begin to operate commercially with 100 percent load beginning in November of this year after a 5-year delay in its construction and an investment of $1.5 billion over a 10-year period.

According to Seabra, at the beginning, the electric power rates will not undergo "any impact readjustment because today they can only be increased 5 percent above the National Consumer-Price Index (INPC)." He made the point, however, that "Furnas' remuneration will have to be at least 5 percent for the energy generated and sold by the company to the concessionaires of the Brazilian Electric Power Stations Corporation (ELETROBRAS), such as the Light Company in Rio, for example."

Seabra said that experts of Westinghouse, the American company responsible for the installation of the plant have been in Angra dos Reis since the beginning of this month, repairing the pipes of the plant's two steam generators, which are utilized for storing heat and activating the turbine.

The problems of cracks in those pipes that have occurred in other nuclear plants in various parts of the world, such as Almaraz in Spain, McGuire in the United States and Ringhals-3 in Sweden, have prevented Furnas from operating Angra-I with more than 50 percent load to avoid contamination of the water from the secondary circuits with the primary one.

Once the defect in those plants was detected, Furnas had to wait more than 1 year for the repair of Angra-I, which represented an additional cost of $100 million, according to Seabra, and an increase per installed kilowatt in the plant from $2,100 to $2,200.

The president of Furnas revealed also that the expenditures connected with the repairs are the responsibility of the manufacturer, in this case Westinghouse.

With a foreign debt of $2.5 billion and a domestic one of 500 billion cruzeiros in addition to a 1-month's delay in meeting the invoices of contractors and suppliers of equipment, Furnas suffered two cuts in its budget for investment. It lost 250 billion cruzeiros, through ELETROBRAS, to the Special Secretariat of State Enterprises (SEST), which reduced it to 190 billion cruzeiros and then to 179 billion cruzeiros.

8711
CSO: 5100/2070

TARAPUR FUEL ISSUE TO BE DISCUSSED WITH SHULTZ

Madras THE HINDU in English 12 May 83 p 1

[Article by G. K. Reddy]

[Text] NEW DELHI, May 11

The US Ambassador, Mr Harry Barnes, who is back from a trip to Washington for consultations, is due to begin a series of talks with the Government at various levels to prepare for the visit of the U.S. Secretary of State, Mr. George Shultz, at the end of next month.

One of the important subjects to be discussed by the Prime Minister, Mrs. Indira Gandhi, and the External Affairs Minister, Mr. P. V. Narasimha Rao, will be the still unresolved issue of the supply of essential spare parts for the Tarapur nuclear power plant.

The Government of India has been playing down the controversy to keep it within manageable limits in the larger interests of Indo-American relations, despite its unconcealed exasperation over the U.S. attitude. But now that the dispute is assuming the dimensions of an internal political controversy, the Government is left with no choice except to voice its resentment publicly in an appropriate manner to meet domestic criticism.

Exposed to hazards?: The Opposition parties were all set to raise this issue in Parliament in a big way following press reports that as a result of the shortage of essential spare parts and poor maintenance, the operating staff of the Tarapur plant was being exposed to grave health hazards through increasing radiation. But the budget session ended yesterday before the Government could be compelled to come forward with an authoritative statement on the real position.

This has given the Government a couple of months to make up its mind in what form the country's indignation should be voiced and how far it should go in articulating this criticism within the framework of over-all Indo-American relations. In any case, the Government does not intend to speak out openly and strongly against the continued U.S. refusal to supply these critical spare parts until the Prime Minister and the External Affairs Minister have had a frank discussion with Mr. Shultz on the subject.

Refusing supply: According to knowledgeable sources here, there are 30 to 40 items that are urgently needed for operating the plant within the prescribed safety limits. The U.S. is refusing to supply most of the sensitive items without a fresh assurance that India will not reprocess the spent fuel, despite its indisputable right to do so, subject to IAEA safeguards, under the 1963 agreement.

The request for the supply of these spares has been kept pending for the last two and a half years on one excuse or the other, until the U.S. finally came out with the apologia that these parts could not be shipped under existing American laws without a categorical commitment by India not to reprocess the spent fuel without co-determination.

No formal refusal: In taking this rigid stand, the U.S. has not formally and finally turned down the Indian request, since it does not want to push India into a corner and compel it to exercise the option of reprocessing the spent fuel by ignoring American objections. It is only prolonging the agony and keeping the whole issue in a state of suspense by holding out the prospect that if the Reagan Administration succeeds in persuading Congress to amend some of the mandatory provisions of the nuclear non-proliferation law enacted in Mr. Carter's time, it should be possible to take a fresh look at the whole problem and perhaps comply with India's requirements.

Meanwhile, the continued uncertainty whether the present chairman of the Atomic Energy Commission, Mr. H. N. Sethna, would be given an extension after he reaches his retirement age in August, has also been complicating the negotiations. The U.S. Government considers him to be a hard-liner and tough negotiator who has consistently taken a very firm stand on the reprocessing issue, irrespective of the political consequences.

May press for better terms: If Mr. Sethna is going to be out by the end of August, the U.S. would rather wait until that time and try to press hard for better terms by focussing the primary attention on the political aspects of

Indo-U.S. relations at a time when India is seeking American cooperation in ensuring a wider international response to the recent non-aligned summit declarations.

As the Government has already decided to extend the term of the chairman of the Space Commission, Prof. Satish Dhawan, it is quite possible that Mr. Sethna also will get an extension. But this is a matter that rests entirely within the Prime Minister's jurisdiction and it is difficult to hazard any guess about what she is going to do when the time comes for taking the decision.

CSO: 5100/7110

EDITORIAL SCORES U.S. STAND ON TARAPUR

Bombay THE TIMES OF INDIA in English 16 May 83 p 8

[Text]

Although the U.S. government will not admit it in so many words, there can be no doubt that it wants to link the supply of essential spare parts for the Tarapur nuclear power plant with the reprocessing of spent fuel by India. To give itself leverage in determining the latter, it has kept Indian requests for the urgent provision of some 30 to 40 items necessary to operate the plant within the stipulated safety limits pending for two-and-a-half years. The Indian government's stand, which is wholly unexceptionable, is that the supply of spares has nothing to do with reprocessing spent fuel. It is nothing short of extraordinary that the U.S. state department should take the view that the U.S. has no contractual obligation to provide spares but only fuel under the 1963 agreement on Tarapur. Under the arrangement arrived at during Mrs. Gandhi's visit to the U.S. in mid-1982, only article II A, laying down the U.S. commitment to supply fuel "as needed", has been suspended, with France taking America's place as the supplier. But the rest of the 1963 agreement "shall remain in effect in all other respects", including Article V which specifically cites the U.S. commitment to the transfer and export to India of "materials, equipment and devices, other than source or special nuclear materials".

As for Indo-U.S. co-determination on reprocessing spent fuel, India has never accepted any abridgement of its right under the 1963 agreement. This position was acceptable to the U.S. as well until the advent of the Reagan administration. Despite this about-turn, New Delhi has made it clear that, as Mrs. Gandhi told Parliament, "the American government does have reservations on this (India's right to reprocess spent fuel on its own) but it does not make any difference to us". It has also been made known to Washington that should India reach the end of its tether on the non-delivery of spares, it might go ahead with reprocessing spent fuel and look for other spares suppliers. The American government contends that the 1978 nuclear non-proliferation act passed by the U.S. Congress prevents it from supplying fuel or components to countries like India which do not meet the requirements laid down in the act. Even if the difficulty is genuine, it is for the U.S. government to find a solution with Congress. A domestic law cannot be invoked to justify dishonouring internationally legal and binding commitments. To the extent the Reagan

administration seems willing to try and reach a compromise with Congress, it is a good thing, especially since it knows the matter is urgent and that the spare parts for Tarapur cannot be used in other nuclear plants or to make nuclear weapons. Nevertheless, so long as U.S. and Indian interpretations of co-determination in reprocessing spent fuel vary and so long as the U.S. seeks to give itself some control over India's nuclear energy programme, the dispute will persist.

CSO: 5100/7112

CONTROVERSY OVER TARAPUR RADIATION LEVEL PERSISTS

Calcutta THE STATESMAN in English 14 May 83 pp 1, 4

[Text] Bombay, May 13.--The recent denial by officials of the Atomic Energy Commission of reports that radiation at the Tarapur Atomic Power Station had been exceeding the acceptable limit, causing health hazards to its employees and the population near the plant, has been accepted by the common people with relief. But it has not succeeded in setting at rest the controversy among knowledgeable circles about what the AEC construes as the acceptable limits of radiation.

One thing clearly emerged at the Press conference addressed by the AEC chairman, Dr H. N. Sethna, on May 11, that over the past 13 years in all 329 people had been exposed to radiation doses in excess of the annual dose limit set by the International Commission on Radiological Protection. Dr Sethna admitted that the average annual dose of TAPS employees had been much higher than the prescribed average every year, since 1972.

However, the contention of Dr Sethna; Dr V. N. Meckoni, director of the Nuclear Safety Group and chairman of the Safety Review Committee, and Dr S. D. Soman, head of the Health Physics Division, was that although in some cases radiation doses had exceeded the prescribed limits, the radiation exposure at TAPS did fall within the overall guidelines of the ICRP. Moreover, these did not at all constitute any health hazard, they maintained.

The radiation exposure is measured in terms of rems, which is the unit of effective radiation absorbed by the body tissue. According to the ICRP guidelines, the maximum permissible limit of radiation exposure for an individual worker is five rems or 5,000 millirems in a year. In TAPS, 31 people were exposed to doses exceeding this limit in 1972. In successive years till 1982, the number of workers exposed to doses beyond this limit was 7, 33, 200, 28, 17, 4, 1, 1, 0 and 2. Dr Sethna admitted that these figures were correct.

Dr Sethna said that firstly, these limits were not absolute and that they were far below the exposure doses which could cause health hazards. According to Dr Meckoni, even a high dose of 15,000 millirems in a very short period was not found to have led to any health hazard. A very high dose of 100,000 millirems in a short duration was dangerous and fatal. In this

context, it must be understood that the safety limit prescribed by the ICRP was 5,000 millirems a year, a very very rigid standard, according to him.

Even the ICRP has laid down that if a dose exceeded the prescribed limit in case of an individual worker, the dose in subsequent years should be reduced so that the worker in question gets the average dose not exceeding the limit, which means in say three years the average exposure of an individual worker should not exceed 15,000 millirems.

Reporters wanted to know whether the TAPS had maintained the medical records of the employees exposed to extra doses of radiation. Dr Sethna said that complete medical records were maintained and agreed to allow the reporters to inspect them. Not a single case of any disease related to radiation had been detected, he affirmed.

A question was asked about the effects of slow radiation. One of the reporters quoted the internationally known expert, Dr Karl Morgan, as saying that for man, there was never a complete repair of radiation damage. Questions were asked about the latest research in regard to slow radiation exposure on chromosomes. The officials conceded this was still a matter of research and controversy, and till something concrete came about one must set standards for acceptable risks.

Another point conceded by Dr Sethna was that the average exposure of each worker at TAPS has been much higher than the prescribed limit of almost every year since 1972. The average radiation exposure of a worker in atomic plants should not exceed 500 millirems in a year, according to the ICRP. And yet at TAPS, every year since 1972, the average exposure dose had been more than four times the prescribed limit of 500 millirems. The highest average was 3,485 millirems, in 1975. Other high average exposure years were 1976--3,311 millirems, 1974--2,990 millirems and 1977--2,947 millirems. In no year, the average exposure dose was below 2,222 millirems, which it was in 1982. This high rate of average exposure is considered alarming by some experts.

Dr Sethna said during maintenance and refuelling activities, personnel from outside the station were also deployed for work. This was a common practice with nuclear power stations in other parts of the world also. The exposure of such temporary workers was also monitored on the same lines as that of the station staff, he said.

The power level at the plant had been restricted largely to stretch the fuel cycle in the past. There were other reasons including problems with equipment which were additional constraints. But the power level was not being restricted in order to prevent emission of radioactive matter into the atmosphere beyond permissible limits, Dr Sethna said. Such emissions were at a very low level and also well within the permissible limits, he affirmed.

It was true that non-availability of spares was causing concern. But the safe operation of the station or the health and safety of the personnel, public and the environment had not been allowed to be endangered in any respect as a consequence, Dr Sethna asserted.

CSO: 5100/7113

WARNING SOUNDED AGAINST NUCLEAR POWER PLANT

BK271403 Delhi INDIAN EXPRESS in English 11 May 83 p 6

[Editorial: "Danger Signals"]

[Text] Even as French enriched uranium fuel for the Tarapur nuclear power station has arrived, there are alarming press reports of unconscionably high levels of radiation at the plant, posing serious health hazards. The reports suggest that India has broken all records in exposing maintenance workers to radiaiton, with some suffering 18,240 millirem exposure against the safety ceiling of 5,000 millirens. Over 50 workers have also received more than the 50 rems considered safe for an entire lifetime. Some maintenance workers have received the entire annual permissible dose in a space of 20 minutes.

For far too long have nuclear matters been wrapped in a cocoon of secrecy. A high-level inquiry is urgently needed into the entire nuclear power programme and information about the performance of plants needs to be made public at regular intervals. It is well known that plant hazards were seriously underestimated 26 years ago (when Tarapur was designed). Since then the capital costs of modern nuclear plants have almost doubled with the need for built-in safety devices, thus affecting their economics. The country has long been told that Tarapur is working well below its installed capacity for want of fuel from the U.S. It now looks as though it is also necessary to operate the plant at a low load factor in order to minimise radiation risks to workers.

The Rajasthan atomic plant at Kota has all the appearance of being a sick unit. The Kalpakkam and Narora projects as well as the heavy water plants are years behind schedule, with consequent escalations in cost. In any case the attempt to master the technology for 235 mw sets represents a search for obsolete, uneconomic technology. The world over, the economic size of a unit is 1,000 MW to 1,300 MW. The DAE [department of atomic energy] has long claimed that nuclear power plants are more economical than coal-based ones when coal has to be transported more than 800 kilometres. It is high time this claim was subjected to searching analysis. It needs to be seen whether the capitals assumed for nuclear plants are anywhere near the actuals. It further needs to be investigated what happens to the economics of a nuclear plant when capacity utilisation drops from 80 percent to the 50 percent or so that DAE has achieved so far. Such a drop is generally disastrous in a highly capital intensive plant. This scrutiny may well reveal that the case for 235 MW plants is extremely poor. But that cannot be an excuse for avoiding such a scrutiny in the name of security.

CSO: 5100/4714

INDIAN DELEGATE SPEAKS IN UN DISARMAMENT COMMITTEE

New Delhi PATRIOT in English 13 May 83 p 3

[Text]

UNITED NATIONS, May 12 (PTI)

INDIA has rejected the theory of "nuclear umbrella" and told the UN Disarmament Commission to urgently intensify ways and means of dealing with the threat of nuclear war and giving an impetus of negotiations on nuclear disarmament.

Indian delegate Ramesh Mulye argued yesterday that no nuclear weapon state or any state allied to it could guarantee that the effects of the use of nuclear weapons could be strictly limited to national or regional boundaries of states possessing nuclear weapons or those protected by their socalled nuclear umbrella.

Mr Mulye recalled the declaration of the seventh Nonaligned Summit which had emphasised that the renewed escalation in the nuclear arms race both in its quantitative and qualitative dimensions as well as reliance on the doctrines of nuclear deterrence had heightened the risk of the outbreak of nuclear war and led to greater insecurity and instability in international relations.

He pointed out that the summit found it unacceptable that the security of all states and the very survival of mankind should be held hostage to the security interest of a handful of nuclear weapon states.

The Disarmament Commission which opened its four-week session earlier this week is placing emphasis on issues relating to the nuclear arms race, the reduction of military budgets and South Africa's nuclear capability.

Mr Mulye said the nuclear programme of South Africa's racist regime had enabled it to acquire a nuclear weapon capability and that capability had been enhanced by the continued support of its collaborators.

US delegate Louis G Fields asserted that his Government was unswervingly committed to the objective of preventing war, not just nuclear war, but any confliction which had the potential to expand, and to raise the spectre of the use of nuclear weapons.

CSO: 5100/7111

THORIUM-FUELLED NUCLEAR REACTOR DEVELOPED

Jerusalem THE JERUSALEM POST in English 5 May 83 p 3

[Article by Charles Hoffman]

[Text] A Tel Aviv University scientist has developed a concept for a nuclear reactor fuelled by thorium, which does not produce fissionable materials that can be used to make atom bombs. Existing reactors are based on uranium.

Foreign investors are considering funding intensive development of the concept, which was devised by Prof. Alvin Radkowsky, considered one of the world's experts in nuclear reactor design. Radkowsky was chief scientist of the marine reactor division of the U.S. Atomic Energy Commission for 20 years, and settled in Israel in the early 1970s.

Conventional nuclear reactors fuelled by uranium produce plutonium as a by-product, which can be recovered and used to make atom bombs.

The head of the nuclear power division in the Energy Ministry, Amnon Einav, explained that Radkowsky's reactor concept is considered "non-proliferative" because the isotope of uranium created as a by-product is almost impossible to convert into weapons-grade material. Einav said that another advantage of the concept is that the type of uranium used with the thorium is less than 20 per cent enriched, and thus easier to obtain.

Thorium, a soft radioactive metal, is found in plentiful quantities on the earth's surface, Einav said, and is about as difficult to mine and refine as uranium. It is not considered a strategic material.

Energy Ministry chief scientist Haim Elata said that U.S. and Canadian scientists have been trying to develop a thorium reactor for many years, but without success. He said that the ministry has already allocated $170,000 for preliminary studies of the feasibility of the concept. It plans to spend another $100,000 on further design studies during the next two years, after which it would be possible to start building a pilot plant.

Elata cautioned that it would take "many years and a lot of money" for the concept to yield a practical pay-off. About $600,000 is needed for the next phase of development.

Elata noted that the successful development of a thorium reactor would make it possible for countries to develop nuclear energy without being bound by the restrictions of the Nuclear Non-Proliferation Treaty. Israel has not signed the treaty because it would require international inspection of all the country's nuclear facilities.

CSO: 5100/4508

BRIEFS

ANTINUCLEAR DEMONSTRATION--Nine antinuclear demonstrators have been arrested in Cape Town. That has been confirmed by police liaison officer (Gerhard van Rooyen). He has said the group of six masked men and three masked women carrying posters on Greenmarket Square constituted an unlawful gathering in terms of the Internal Security Act. The anti-Koeberg Alert Group reported earlier that nine of their members had been arrested while taking part in a [word indistinct] to raise public awareness about nuclear power dangers. Wearing masks and black shrouds, the protesters were carrying posters and a coffin emblazoned with antinuclear emblems while one rang a bell. The protesters lay on the ground before being arrested by about 40 police officers who arrived in vans and a microbus. According to a member of Koeberg Alert, a police officer told the protesters they were loitering. The member said those arrested were taken to Caledon Square. [Text] [MB050703 Umtata Capital Radio in English 0600 GMT 5 Jun 83]

CSO: 5100/42

NUCLEAR WASTE TREATMENT POLICY EXAMINED

Duesseldorf ATOMWIRTSCHAFT/ATOMTECHNIK in German May 83 pp 273-275

[Article by W. Gries, Hanover: "Radioactive Waste; Nuclear Waste Disposal in Sweden"]

[Text] Sweden is the country in which peaceful utilization of nuclear energy has been limited through parliamentary decision to a period up to the year 2010. It is also the country in which nuclear power production in 1982 contributed nearly 40 % of the overall power production. For industrial users this has resulted in an average electricity cost of slightly more than half of that of the FRG. Finally, Sweden is the country in which a waste disposal program with a precise time plan for individual projects has been set up, the realization of which is considered obvious, in which final storage for the highly radioactive waste realistically is not intended to be operational until the year 2020, 10 years after the Swedish nuclear power plants have ceased to operate.

Introduction

Since the popular referendum on 23 March 1980 in Sweden concerning the use of nuclear energy, Sweden's nuclear program has been limited to 12 nuclear power plants with 9,500 megawatt capacity. No nuclear plant is to be in operation after 2010. At the present, 40 % of the power in Sweden is produced with nuclear energy. In a few years, when all the nuclear power plants have been completed, the share will be about 45 %. Sweden will then be the only country in the world which from the outset has imposed a time limit on its nuclear energy program. Nuclear waste disposal is therefore limited to dealing with the waste connected with the extraction of power from this licensed nuclear power plant capacity. A total power output of 1.5 billion kilowatt hours (1.5×10^{12} kWh) is expected up to the year 2010 from the power plant capacity in Sweden. This is the equivalent of burning 500 million tons of hard coal in hard coal-based power plants. The nuclear plants installed in Sweden are boiling water reactors (BWR) and pressurized water reactors (PWR). These nuclear power plants are listed in detail in Table 1.

1. The Waste Disposal Concept

The Swedish nuclear waste disposal concept for limited reprocessing of nuclear power is represented schematically in Fig. 1.

Seven thousand tons of spent fuel elements are anticipated from operating the 12 nuclear power plants. Of this amount 12.5 % is being disposed of by means of reprocessing abroad. However, the uranium and plutonium must be returned to Sweden. These substances will then be reused in nuclear power plants in mixed oxide fuel rods and, having been used once, will later be sent to direct final storage. Some of the radioactive waste which returns from abroad is initially put into interim storage, before later being brought to a specially prepared final storage site. For the remainder of the fuel elements from Swedish nuclear plants longer interim storage of at least 40 years has been planned. This interim storage, Clab, which will be discussed in detail later on, is an important buffer for the final waste disposal of all fuel elements. Direct final storage of these fuel elements is planned after corresponding conditioning at a final storage site. A final storage site which can receive these low- and intermediate-level radioactive wastes has been planned for the waste from all nuclear power plant operation, a total of about 130,000 m^3, and the waste from shutting down the nuclear technology facilities in Sweden --about 170,000 m^3. This site is to be available after 1988.

Table 1. Nuclear Power Plants in Sweden

Name	Type	Net output in MW
Oskarshamn-1	BWR	440
Oskarshamn-2	BWR	570
Ringhals-2	PWR	800
Barseback-1	BWR	570
Forsmark-1	BWR	900
Ringhals-3	PWR	915
Forsmark-2	BWR	900
Ringhals-4	PWR	915
Forsmark-3	BWR	1,050
Oskarshamn-3	SWR	1,050
Total		9,430

Consequently, Sweden has a clear concept of nuclear waste disposal with emphasis on interim storage for a foreseeable future and final storage in a geological formation, which will be chosen with extreme care.

The basis for the now existing Swedish waste disposal concept was also pressure from the government, as a result of the public opinion, to make waste disposal a condition for the operation of nuclear power plants. The most important legal framework conditions for nuclear waste disposal in Sweden are:

--A nuclear law for the construction and operation of nuclear power plants;
--A radiation protection law, which includes the state's framework of regulations for ionizing radiation;
--An environmental law, which regulates the environmental effects;
--A licensing law, which obligates the owner of a nuclear power plant to guarantee disposal of the waste before loading this plant with fuel elements.
--A financing law, which regulates the division of labor between the state and the industry in nuclear waste disposal. A disposal fee (at the present 0,018 Skr/KWh) is administered under government supervision.

The preceding sketch of nuclear waste disposal in Sweden is therefore guaranteed by its legal framework. In order to fulfill this concept and the legal framework, an organization, schematically described in Fig. 2, has been established by the state and the industry.

The Swedish descriptions of the individual organizations are contained in the annual reports of the central organization SKBF (Swedish Nuclear Energy Development Commission).[1] These annual reports are also written in English.

Table 2: Nuclear Waste Quantities in Sweden

Kind	Origin	Form	Quantity
Spent nuclear fuel elements	Nuclear power plant	Fuel elements in copper canisters	4,500 canisters
Highly radioactive waste	Foreign reprocessing	Vitrified blocks in canisters	730 canisters
Transuranic wastes	Foreign reprocessing	Solidified in cement or bitumen	4,000m^3
Reactor core components	Nuclear power plant	Solidified in cement	15,000m^3
Waste from operation	Nuclear power plant	Solidified in cement or bitumen	122,000m^3
Shutdown waste and other facilities	Nuclear power plant	no particular form	166,000m^3

The state establishes the framework of regulations and through a special supervisory organization (NAK) maintains control over the funds, which accrue through the disposal surcharge to the state. The Swedish electricity-producing enterprises regulate their waste disposal via the central organization SKBF. Within this organization, the KBS section deals with research and development. The other sections have other corresponding tasks. It is important that the entire field of nuclear waste disposal, that is to say including final storage, takes place through SKBF or with the subsection KBS, in contrast to the FRG, where formally final storage is to take place via state institutions or authorized third parties.

2. Waste Quantities and Projects

The total amounts involved in the disposal of waste for the planned nuclear capacity is, according to Swedish information [1-6], as compiled in Table 2. In order to dispose of these quantities of waste, a precise time plan has been established for the projects, and the disposal takes place via the SKBF or KBS. The disposal plan according to information by SKBF [1] can be seen in Fig. 3.

The individual nuclear disposal projects are as follows:

1. Foreign contracts for reprocessing 867 t uranium have been signed with the French firm of COGEMA and the English firm of BNFS. For 727 t uranium in spent fuel elements there is an option of sending the waste back from the reprocessing to the Swedish customer SKBF. Furthermore, the 850 t uranium and 6 t plutonium are to be transported back to Sweden. There they will be processed into mixed oxide fuel elements, which will later be used in the nuclear power plants.

2. Transportation by sea is of the highest priority for all radioactive waste and fuel elements. These special ships for radioactive waste can be used in Sweden, because all nuclear plant locations are by the sea. The first ship has been completed.

3. The central interim storage site CLAB at Oskarshamn, an underground wet storage, is under construction. Operation will begin in 1985. The capacity has initially been designed for 3,000 t, which is sufficient until the mid-1990's. It can later be expanded to 7,000 t.

4. The interim storage for 730 canisters of vitrified highly radioactive waste is to be completed by 1990 and will also be built near Oskarshamn or at the site of the Forsmark final storage for radioactive waste. An interim storage for transuranic wastes, a total of 4,000 m^3, has been planned for the same site. This storage site will also begin operation in 1990.

5. The additional facilities planned in Sweden will not begin operation until the end of the century and in the next century. The nucleus of these is a final storage site for radioactive waste except for highly radioactive waste. This final storage will be Forsmark. Final storage for highly radioactive waste will not be ready for operation until 2020. This site will simultaneously also be suitable as final storage for conditioned fuel elements, meaning for direct final storage. The site for highly radioactive waste will in addition also receive the packaged transuranic waste from the entire nuclear energy operation. The final storage for the portions of the reactor core which result from dismantling the nuclear power plants will then be the last to begin operation in 2025.

With this time plan Sweden believes it has solved its own limited, national nuclear waste disposal problem. The corresponding research and development work, which is naturally focused on the final storage of different variants of radioactive wastes or spent fuel elements, has been adjusted to his plan. The

annual SKBF reports give information about the stage of the development and provide an overview of the various professional articles [7-10].

In conclusion it may be stated, that the Swedish nuclear waste disposal model, which is based on a limited nuclear program, appears realizable according to the state of the science and technology. In Sweden a closed disposal concept is being implemented with a relatively small research and development effort.

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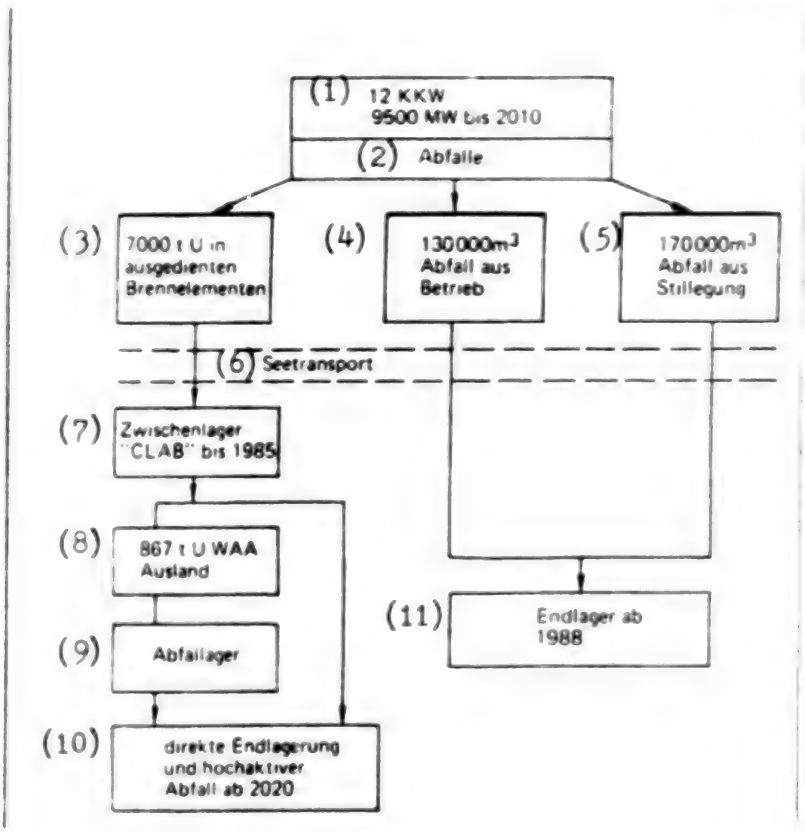

Fig. 1: The Swedish Nuclear Waste Disposal Concept.

Key:
1. 12 nuclear power plants, 9,500 MW until 2010
2. Waste
3. 7,000 t uranium in spent fuel elements
4. 130,000 m^3 waste from operation
5. 170,000 m^3 waste from shutdown
6. Transportation by sea
7. "CLAB" interim storage until 1985
8. Foreign reprocessing of 867 t uranium
9. Waste storage
10. Direct final storage and highly radioactive waste after 2020
11. Final storage after 1988

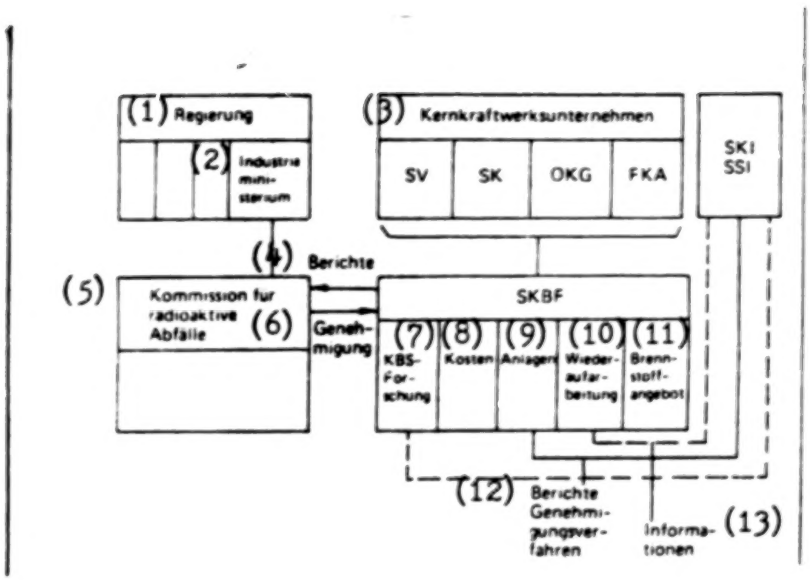

Fig. 2: Scheme of Organization for Nuclear Waste Disposal in Sweden [1].

SKBF = Svensk Karnbransleforsorjning [Nuclear Energy Development Commission]
KBS = Karnbranslesakerhet [Nuclear Power Safety (Project)]
SKI = Reactor Safety Commission
SSI = Radiation Protection Commission
Sv, SK, OKG, FKA = Swedish electricity enterprises

Key:
1. Government
2. Ministry for Industry
3. Nuclear power enterprises
4. Reports
5. Commission for Radioactive Waste
6. Licensing
7. KBS research
8. Cost
9. Plants
10. Reprocessing
11. Fuel supply
12. Reports, licensing procedures
13. Information

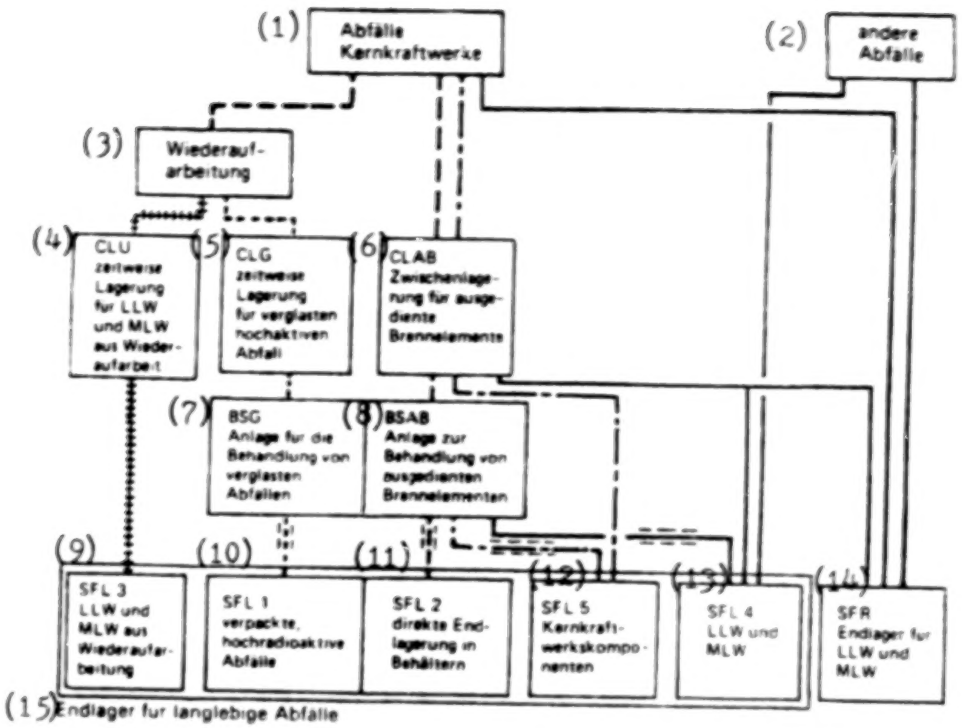

Fig. 3: Handling of Radioactive Waste in Sweden According to Plan [1].
- - - - spent fuel elements
..... highly radioactive, vitrified waste
_.-._.-._ nuclear power plant components
++++++++++ low- and medium-level radioactive wastes (LLW, MLW) from reprocessing
_____ LLW, MLW from nuclear plant operation and from the shutdown
= = = = internal transportation

Key:
1. Waste from nuclear power plants
2. Other waste
3. Reprocessing
4. CLU; temporary storage of LLW and MLW from reprocessing
5. CLG; temporary storage of vitrified, highly radioactive waste
6. CLAB; interim storage of spent fuel elements
7. BSG; facility for handling vitrified waste
8. BSAB; facility for handling spent fuel elements
9. SFL 3; LLW and MLW from reprocessing
10. SFL 1; packaged, highly radioactive waste
11. SFL 2; direct final storage in canisters
12. SFL 5; nuclear power plant components
13. SFL 4; LLW and MLW
14. SFR; final storage for LLW and MLW
15. Final storage for long-lived waste

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